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Body Dysmorphic Disorder in different settings: A systematic review and estimated weighted prevalence

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Abstract

Our aim was to systematically review the prevalence of Body Dysmorphic Disorder (BDD) in a variety of settings. Weighted prevalence estimate and 95% confidence intervals in each study were calculated. The weighted prevalence of BDD in adults in the community was estimated to be 1.9%; in adolescents 2.2%; in student populations 3.3%; in adult psychiatric inpatients 7.4%; in adolescent psychiatric inpatients 7.4%; in adult psychiatric outpatients 5.8%; in general cosmetic surgery 13.2%; in rhinoplasty surgery 20.1%; in orthognathic surgery 11.2%; in orthodontics/cosmetic dentistry settings 5.2%; in dermatology outpatients 11.3%; in cosmetic dermatology outpatients 9.2%; and in acne dermatology clinics 11.1%. Women outnumbered men in the majority of settings but not in cosmetic or dermatological settings. BDD is common in some psychiatric and cosmetic settings but is poorly identified.

Keywords: body dysmorphic disorder; prevalence; screening; epidemiology

Prevalence of body dysmorphic disorder in different settings: A systematic review

Body dysmorphic disorder (BDD) consists of a preoccupation with a perceived defect. The 'defect(s)' is not noticeable to other people (or is minimal); however, it is associated with shame, depression, and a poor quality of life. BDD can be a chronic disorder, which persists for many years if left untreated, with surveys at specialist centres concluding high rates of psychiatric hospitalisation, suicidal ideation, and completed suicide (Phillips, Coles, et al., 2005; Phillips & Menard, 2006; Veale, Boocock, et al., 1996).

Many resources are wasted on those with BDD who attend dermatological or cosmetic surgery settings in an attempt to "fix" their imagined defect and receive physical treatments instead of the psychiatric help they actually need (Phillips, Dufresne, Wilkel, & Vittorio, 2000; Sarwer, Pertschuk, Wadden, & Whitaker, 1998). Such patients are often dissatisfied with their cosmetic procedure and symptoms of BDD persist. However, BDD appears to be relatively uncommon as a presenting problem in psychiatric services or it is poorly identified (Veale, Akyüz, and Hodsoll (2015). This may be because of stigma so that it presents in psychiatric services because of comorbidity (for example depression). Knowledge of the most common co-morbid presentations may assist in identifying BDD. The reported sex ratio also appears to differ widely. Thus the sex ratio is reported as equal in a specialist BDD service (Phillips & Menard, 2006) compared to a ratio of 2.58 female to male in the community (Schieber, Kollei, de Zwaan & Marti (2015). Therefore, knowledge of the epidemiology of BDD would be important for public health in order to identify settings in which it would be necessary to screen for BDD, the most appropriate screening measures, the most common co-morbid diagnoses and the sex ratio.

Screening for possible symptoms of BDD was never included in the early large catchment area surveys of psychiatric morbidity (Kessler et al., 1994; Singleton, Bumpstead, O'Brien, Lee, & Meltzer, 2001; Wells, Bushnell, Hornblow, Joyce, & Oakley-Browne, 1989). However, despite the fact that BDD was not identified in epidemiological surveys of psychiatric morbidity, a number of prevalence studies have since been conducted. These prevalence studies investigate BDD in a range of settings; however prevalence rates and sex ratios within each setting appear to vary widely. This has created a confused overall picture of how common or rare BDD actually is. The aim of this systematic review was therefore to determine (a) the weighted prevalence rate of BDD in different settings, (b) the type of screening question or questionnaire used for identifying BDD, (c) comorbidity through which it may present in psychiatric services, and (d) the sex ratio in different settings.

Method

Eligibility Criteria

Studies were included if two of the authors agreed on the following criteria: (a) BDD was diagnosed or screened using a validated measure or interview; (b) an estimated prevalence and a total number of the population affected was provided; and (c) the study was published in the English language. Studies were excluded if: (a) they were published in a language other than English; (b) BDD prevalence was not provided; (c) they were a systematic or literature review; (d) they were a case study; or (e) they were a comorbidity study.

Information Sources

Ovid Medline, Embase and PsychINFO were used to obtain separate literature searches up to June 2015. The results from the three databases were subsequently collated and duplicates

removed. In addition, the authors inspected the reference sections of relevant papers retrieved through the database search.

Search

The search strategy was: (a) epidemiology OR epidemiologic studies OR incidence OR prevalence OR occur* OR frequenc* OR proportion* OR rate* OR number* OR percent*; (b) body dysmorphic disorder.sh. OR body dysmorphi$ OR dysmorphophobi$ OR imagine$ ugl$.mp; (c) a AND b.

Study Selection

The title and abstract of retrieved studies that contained search terms from both (a) and (b), that is (c), were screened by one author according to perceived relevance. The full-text articles of relevant studies were then reviewed by two authors and only included if they met the study inclusion and exclusion criteria.

Data Item

Data extracted from each study included the authors, publication date, population studied, location of study, number of participants (*n*), estimated prevalence and confidence interval in both sexes (both in total sample and in those diagnosed with BDD), mean age and range of participants (where available), method of screening, whether an interview was used to diagnose, and screening for any other disorders along with their prevalence (if available).

Summary Measure

The principal summary measures were the *n*, estimated prevalence, and confidence interval in the total and by sex.

Synthesis of Results

The prevalence of BDD in each sample was computed by dividing the number of diagnosed cases of BDD by the total number of participants/patients. To combine the prevalence estimates from the different settings we weighted the prevalence estimator by the sample size in each unit. To pool the prevalence data we used random effects logistic with exact binomial likelihood to model the within-study distribution. This analysis method was preferred to avoid bias due to many of the prevalence estimates being close to 0 (Hamza, van Houwelingen, & Stijnen, 2008). As the model is fit iteratively, explicit variance weightings for the studies are not available. A *Z* test assessed whether the proportion was different from 0, with τ^2 testing between-study variance of prevalence. Heterogeneity was assessed with a likelihood ratio test (χ^2) comparing model fit for fixed and effects model and quantified, when possible, with I^2 to determine the percentage of between-study variance which is due to heterogeneity rather than chance. Models were fit with the metaprop_one 1.2 (Nyaga, Arbyn, & Aerts, 2014) procedure in STATA 14.1 IC (Stata Corporation). As 95% confidence intervals based on the normal approximation are not accurate for prevalence estimates near the 0 or 1 boundary, we used the Agresti and Coull (1998) method to calculate confidence intervals using STATA (Stata Corporation). For the psychiatric inpatient setting, we removed the data on adolescents (n = 21) from the study by Grant, Kim, and Crow (2001) to enable the comparison with adult settings (Table 4). Data from studies in dermatology were separated into general dermatology settings, dermatology settings specializing in acne, and cosmetic dermatology settings (non-surgical procedures). When calculating overall weighted prevalence within each setting, we did not include studies that only included a single sex (i.e. female only studies). However these were included when weighted prevalence was calculated for each sex individually.

Results

Study Selection

Figure 1 provides a flowchart of the systematic search, and the number of studies that were screened for eligibility and subsequently excluded or included in the final review. Four studies were excluded because they were not published in the English language; nine because they were comorbidity studies rather than studies of BDD prevalence; twelve because they did not provide a prevalence of BDD; five because they were literature or systematic reviews, or case studies; one because it specifically recruited patients with BDD only; two because they used data from a previous study; one because patients in its sample had real "defects"; three because no validated measure of BDD was used to diagnose the disorder; six because they were not investigating BDD (only body image, body dissatisfaction or "dysmorphic concern"); one as it was a conference abstract; one because it was a poster presentation, and one because it was an unpublished thesis study.

Study Characteristics

The characteristics of all studies extracted for inclusion are shown in Tables 2 to 13. The weighted prevalence for each sex and total for different settings is shown at the bottom of each table, along with measures of between-study heterogeneity. The locations of the studies were in Germany (5), France (1), USA (19), UK (4), Italy (5), Iran (4), Turkey (4), Sweden (1), Belgium (1), Chile (1), The Netherlands (2), Australia (2), Brazil (2), Pakistan (1), China (1), Taiwan (1), Japan (1), and Singapore (1). The prevalence and study characteristics of each of the settings will now be described.

Methods of Screening

A variety of tools was used to screen patients/participants for the presence of BDD. The BDDQ was the most commonly used, and has been validated against the SCID for use among

females in the community, with a sensitivity and specificity of 94% and 90% respectively (Brohede, Wingren, Wijma, & Wijma, 2013). It has also been validated against the SCID in a facial cosmetic surgery sample (Dey et al., 2015), with a sensitivity of 100%, specificity of 90.7%. In addition, validation studies for the BDDQ have also been conducted in psychiatric outpatients with a sensitivity of 100% and specificity of 89% (Phillips, Atala, & Pope, 1995), as well as a psychiatric inpatient sample (Grant et al., 2001): 100% sensitivity and 92.5% specificity. A modified version has been used in dermatology settings, the BDDQ-DV (Dufresne, Phillips, Vittorio, & Wilkel, 2001). This measure has been validated against the SCID for BDD and has 100% sensitivity and 92.3% specificity in a dermatology setting.

The Cosmetic Procedure Scale (COPS) (Veale et al., 2012) has been validated in those seeking cosmetic surgery and has a sensitivity of 88.9% and specificity of 93.2%. It has been modified for identifying BDD in men preoccupied with penis size (COPS-P) (Veale, Miles, et al., 2015) and in women seeking labiaplasty (COPS-L) (Veale et al., 2013).

The DCQ has also been validated in a dermatology outpatient setting, with a sensitivity of 72% specificity of 90.7% (Stangier, Janich, Adam-Schwebe, Berger, & Wolter, 2003), and a BDD outpatient setting: sensitivity 96.4% and specificity 90.6% (Mancuso, Knoesen, & Castle, 2010).

The BIDQ (Cash, Phillips, Santos, & Hrabosky, 2004) is modified from the BDDQ for more continuous scoring, but has not been validated against a SCID; therefore the sensitivity or specificity is not known and has not been adopted as a screening tool.

A study of BDD in rhinoplasty surgery settings validated the BICI-SR (Persian version), and compared it to a “gold standard” psychiatric interview (Ghadakzadeh, Ghazipour, Khajeddin, Karimian, & Borhani, 2011). The original version of the BICI (Littleton, Axsom, &

Pury, 2005) displayed a low sensitivity (67%) and high specificity (96%) among a population of undergraduate students. Following on from this, the Persian version of this measure mentioned above was also found to have good sensitivity and specificity (93.5% and 80.8% respectively).

Adults in the Community

Seven (n = 13,773) studies were found on the prevalence of BDD in the community and the overall weighted prevalence was 1.9%. The characteristics and weighted prevalence of these studies are shown in Table 2. Prevalence ranged from 0.7% in the earliest study (Faravelli et al., 1997), to 3.2% in the most recent study (Schieber, Kollei, de Zwaan, & Martin, 2015). In each of the studies that included both male and female subjects, prevalence of BDD was found to be higher among females (2.1%) than males (1.6%), which is a ratio of 1.27. Percentage of between-study heterogeneity in this setting, measured by I^2, was substantial (55.0%). Three of the seven studies investigating BDD in the community also investigated prevalence of other disorders, with these studies reporting the prevalence of mood and anxiety disorders among their populations (see Table 2).

Only two (Faravelli et al., 1997; Otto, Wilhelm, Cohen, & Harlow, 2001) of the seven studies used a clinical interview to diagnose BDD and neither of these used a defect severity scale. However, the interview selected for use varied, with Faravelli et al. (1997) choosing a "flow chart interview", and Otto et al. (2001) choosing the Structured Clinical Interview (SCID) for DSM-IV (First, Spitzer, Gibbon, & Williams, 1995a). In addition, one study (Schieber et al., 2015) used both the DSM-IV (American Psychiatric Association, 1994) and DSM5 (American Psychiatric Association, 2013) diagnostic criteria to diagnose BDD. This found that DSM5 criteria reduced the prevalence slightly from 3.2 to 2.9%.

Adolescents in the Community

Only one study estimated the prevalence of BDD in adolescents in the community (Mayville, Katz, Gipson, & Cabral, 1999). 13 of 464 adolescents were found to meet DSM-IV diagnostic criteria for BDD (prevalence 2.2%; females (2.8%) and males (1.7%), which is a ratio of 1.64). Participants were screened with the Body Image Rating Scale (Mayville, Gipson, & Katz, 1998); however no structured clinical interview or defect severity scale was carried out to diagnose BDD. This may be particularly important in adolescents who are often self-conscious and worried about their appearance.

Students

Eight studies were found for the prevalence of BDD among University and College students (n = 3,516). The characteristics and weighted prevalence of these studies are shown in Table 3. Estimates ranged from 1.2% (Liao et al., 2010) to 5.8% (Taqui et al., 2008). The overall weighted prevalence across all studies was 3.3%, with a higher prevalence among females (3.6%) than males (2.2%), which gives a ratio of 1.64. The average age of students in these studies was 21.1 years old (*SD* 2.3). Percentage of between-study heterogeneity in this setting, measured by I^2, was moderate (43.6%). None of the studies included, however, investigated prevalence of any other disorder within their population, and only one (Cansever, Uzun, Dönmez, & Özşahin, 2003) out of eight studies used a structured clinical interview to diagnose BDD and it did not use a defect severity scale. Five of the eight studies screened patients using the Body Dysmorphic Disorder Questionnaire (BDDQ) (Bartsch, 2007; Bohne, Keuthen, Wilhelm, Deckersbach, & Jenike, 2002; Bohne, Wilhelm, et al., 2002; Liao et al., 2010; Sarwer et al., 2005). Two of these studies also used the Dysmorphic Concern Questionnaire (DCQ) (Oosthuizen, Lambert, & Castle, 1998) in addition to the BDDQ (Bartsch, 2007; Liao et al., 2010). One study stated that “some items” of the Body Dysmorphic Disorder Evaluation

(BDDE) were used to screen for BDD (Cansever et al., 2003), while another study used the self-report version of the BDDE (BDDE-SR) (Boroughs, Krawczyk, & Thompson, 2010). Another study used the Body Image Disturbance Questionnaire (BIDQ) to screen students for BDD (Taqui et al., 2008).

Family Doctor Surgeries

We found only one study in a family doctor setting that examined the prevalence of somatoform disorders (that includes BDD in DSM-IV) (de Waal, Arnold, Eekhof, & Van Hemert, 2004). However, it did not use an adequate method of screening to detect BDD and did not find any cases. We describe this study as it highlights some of the problems that are likely to bias a study against finding cases of BDD. They screened 1046 consecutive patients aged 25–80 years in a Dutch general practice with the SF-36 functional limitation questionnaire (Brazier et al., 1992), the Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983) and a physical symptom checklist. Of those defined as being at high risk, 80% received a standardised diagnostic interview (Schedule for Clinical Assessment in Neuropsychiatry (Wing et al., 1990). The prevalence of DSM-IV anxiety disorders was 5.5%, depressive disorder: 5.5%, somatoform disorders: 16.1%, and undifferentiated somatoform disorder: 13.1%. The latter includes one or more unexplained physical symptoms (e.g. fatigue, headache) that cause clinically significant distress or impairment. They found no cases of BDD. However, the study excluded anyone under the age of 25, which is where we would expect many of the BDD cases to occur (Phillips, 1991). In addition, none of the screening tools used for depression or anxiety enquired about symptoms of BDD, and the Schedule for Clinical Assessment in Neuropsychiatry (SCAN) that was used is inadequate for detecting BDD, as there is only one question that asks whether subjects' appearance may have *changed* recently.

Adult Psychiatric Inpatients

Four studies (n = 788) were found on the prevalence of BDD in adult inpatient psychiatric wards. The characteristics and weighted prevalence are shown in Table 4. The overall weighted prevalence across all studies was 7.4%, with a higher prevalence among females (9.6%) than males (5.6%), giving a ratio of 1.71. The prevalence for BDD varied widely between studies from 1.9 – 16.0%. This may be related to the relatively small sample size and wide confidence interval in three of the four studies (n = 100-155). The prevalence rate in an inpatient setting is also likely to vary depending on the diagnostic intake. Thus, two of the inpatient settings in the USA had a high prevalence of mood disorder: 55.0% in Conroy et al. (2008) and 75.0% in Grant et al. (2001). We also might expect a higher rate of BDD in those identified with substance misuse, which was diagnosed in 50.8% of the sample in Grant et al. (2001) but in only 2.0% of Conroy et al. (2008). A key finding in all these studies was that BDD was poorly identified as none of the patients revealed their symptoms of BDD during a routine history. This was mainly reported to be because of shame or lack of knowledge about BDD or its treatment, or a desire to avoid the problem. Percentage of between-study heterogeneity in this setting, measured by I^2, was substantial (72.6%).

Adolescent Psychiatric Inpatients

Two studies (n = 229) were found on the prevalence of BDD in adolescent inpatient psychiatric wards. The characteristics and weighted prevalence are shown in Table 5. The overall weighted prevalence was the same for adolescents as for the adult inpatients (7.4%), again with a higher prevalence among females (6.9%) than males (3.5%) with the ratio being 1.97. However, one of the two studies was much larger, contributing to 90.8% of the weighting (Dyl, Kittler, Phillips, & Hunt, 2006). This screened adolescents using the BDDQ (Phillips, 1996), but did not

use a SCID. The findings may therefore be biased. In this study, similar to the adult settings, bipolar disorder (40.4%) and major depressive disorder (MDD) (39.4%) were the most common diagnoses in the adolescent inpatients.

Adult Psychiatric Outpatients

Three studies (n = 765) were found for the prevalence of BDD in mainly specialist outpatient settings. The characteristics and weighted prevalence of these studies are shown in Table 6. The overall weighted prevalence across all studies was 5.8%, with a higher prevalence among females (6.5%) than males (4.6%), with the ratio being 1.41. Percentage of between-study heterogeneity in this setting, measured by I^2, was moderate (47.7%). All studies used a clinician-administered SCID to diagnose BDD. The prevalence ranged from 3.2% (Zimmerman & Mattia, 1998) to 11.0% (Kelly, Zhang, & Phillips, 2015). Major depressive disorder was the most common primary diagnosis in two of the three outpatient studies: 54.8% (Zimmerman & Mattia, 1998); 46% (Kelly et al., 2015), while social phobia was also found to be relatively common in two studies: 15.2% (Wilhelm, Otto, Zucker, & Pollack, 1997); 29% (Zimmerman & Mattia, 1998).

General Cosmetic Surgery

Eleven studies (n = 2,291) were found for the prevalence of BDD in cosmetic settings. The characteristics of the studies are shown in Table 7. Prevalence ranged very widely from 6.3% (Altamura, Paluello, Mundo, Medda, & Mannu, 2001) to 53.0% (Vindigni et al., 2002), and the overall weighted prevalence for BDD in this setting was 13.2%.

In direct contrast to the majority of other settings, the prevalence of BDD in this setting was higher among males (15.3%) than females (10.9%) with the ratio being 0.71. The percentage of between-study heterogeneity in this setting, measured by I^2, was considerably higher (90.0%).

There were no patterns in the use of a screening tool, with two studies using the Yale-Brown Obsessive Compulsive Disorder scale, modified for BDD (BDD-YBOCS) (Altamura et al., 2001; Bellino et al., 2006). Strictly speaking, this is used to measure the severity of BDD symptoms and is not a diagnostic tool. One study used the BDDQ (Dey et al., 2015), two studies the Multidimensional Body-Self Relations Questionnaire (MBSRQ) (Sarwer, Wadden, Pertschuk, & Whitaker, 1998; Vargel & Uluşahin, 2001), and two studies the BDDE and BDDE-SR respectively (Sarwer, Wadden, et al., 1998; Vindigni et al., 2002).

There was no consistency in the interview conducted, with two studies merely stating that "an interview" was used to diagnose BDD (Ishigooka et al., 1998; Vargel & Uluşahin, 2001), three studies stating the use of the BDD-SCID-I (Altamura et al., 2001; Bellino et al., 2006; Dey et al., 2015), two studies citing the BDD-SCID-II (Aouizerate et al., 2003; Vindigni et al., 2002), one study using the MINI-International Neuropsychiatric Interview (MINI) (Pavan et al., 2006), and three studies failing to use a clinical interview at all. Only three of these studies utilised a defect severity scale to rate the perceived defects in their participants.

Sensitivity analysis conducted on data in this setting revealed that when potential outliers were removed (Pavan et al., 2006; Vindigni et al., 2002), as both reported BDD prevalence figures were considerably higher than they were in other studies in this setting, between-subject heterogeneity was no longer significant, and I^2 was reduced to 0.0, suggesting that these two studies may have had an effect on the weighted prevalence figure in cosmetic surgery clinics. It is not known why these studies found a prevalence of BDD so much higher than elsewhere, as both used some form of structured clinical interview. However, it is clear that in this setting there is inconsistency in the screening and testing for BDD, which may lead to overestimation.

Excluding Vindigni et al (2002) and Pavan et al (2006) reduces the prevalence estimate from 13.2% to 7.6% (CI 5.6-10.3%).

Rhinoplasty Surgery

Seven studies (n = 1,001) were found for the prevalence of BDD in rhinoplasty surgery candidates. The characteristics and weighted prevalence of these studies are shown in Table 8. Prevalence figures in this setting range from 1.8% (Picavet et al., 2012) to 31.5% (Fathololoomi, Goljanian, Fattahi, Noohi, & Makhdoom, 2013). This category therefore seems to represent the greatest degree of uncertainty in the diagnosis of BDD. We calculated a weighted prevalence of 20.1%. There was a slightly higher prevalence among males (18.4%) than females (16.7%), with the ratio being 0.91. Percentage of between-study heterogeneity in this setting, measured by I^2, was considerable (90.5%). One study investigated the prevalence of BDD only among *secondary* rhinoplasty candidates (Constantian, 2012). Four of seven studies stated the use of a structured diagnostic interview, with one citing a DSM-IV semi-structured interview (Ghadakzadeh et al., 2011), two stating the use of the BDD-YBOCS (Picavet et al., 2012; Veale, De Haro, & Lambrou, 2003), and one just stating "a clinical interview" was used to diagnose BDD (Felix et al., 2014). There was also no consistency in the way that BDD was screened for, with one study stating that the DSM-IV (American Psychiatric Association, 1994) was used to screen participants while another stated that the DSM-IV-TR (American Psychiatric Association, 2000) was used to screen for BDD (Alavi, Kalafi, Dehbozorgi, & Javadpour, 2011). One study opted to use the BDDQ to screen for BDD (Veale, De Haro, et al., 2003), while another used a Brazilian version of the BDDE (Felix et al., 2014). A further study actually validated a Persian, self-report version, the Body Image Concern Inventory (BICI-SR) (Ghadakzadeh et al., 2011), while

another merely stated that a "4-item BDD questionnaire" was used to screen for BDD (Fathololoomi et al., 2013).

Five of the seven used a defect severity scale (Constantian, 2012; Felix et al., 2014; Ghadakzadeh et al., 2011; Picavet et al., 2012; Veale, De Haro, et al., 2003), therefore suggesting that two did not assess the presence of a perceived defect at all. However, the type of scale used again varied from study to study. Two studies used a clinician-rated 2-point scale, with "1" representing no defect/slight defect and "2" representing a clear defect (Felix et al., 2014; Ghadakzadeh et al., 2011). One study used a clinician-rated 1- to 5-point scale, with "1" representing no deformity, and "5" representing the worst deformity (Constantian, 2012), while another used a clinician-rated 25-point nasal deformity scale, with "25" representing a perfect nasal tip (Picavet et al., 2012).

Orthognathic Surgery

Only two studies (n = 259) were found for the prevalence of BDD in orthognathic surgery settings. The characteristics and weighted prevalence of these studies are shown in Table 9. In this setting, the prevalence of BDD across the two included studies ranged from 10% to 13.1%. Our estimated weighted prevalence was 11.2% (13.2% in women and 8.0% among men, giving a ratio of 1.65).

Only one study investigated the presence of other axis I disorders, concluding a prevalence of obsessive compulsive disorder (OCD) in 29.3%, MDD in 16.2%, and anxiety disorders in 23.2% (Collins, Gonzalez, Gaudilliere, Shrestha, & Girod, 2014). Only one study (Vulink et al., 2008) implemented a clinician-rated defect severity scale (1-4; 1 = no defect, 4 = severe defect). Vulink et al. (2008) used questions from the BIDQ and BDDE to screen

participants, and followed the DSM-IV criteria for BDD, while Collins et al. (2014) screened patients with the BIDQ but did not use a clinical interview.

Orthodontics/Cosmetic Dentistry

Three studies (n = 480) were found for the prevalence of BDD in those having orthodontic treatment or cosmetic dental surgery (Table 10). In these studies, prevalence ranged from 4.2% to 7.5%. The estimated weighted prevalence of BDD (5.2%), showed a higher prevalence among females (7.9%) than males (2.5%), giving a ratio of 3.16. Only one study used a semi-structured interview to diagnose BDD (Hepburn & Cunningham, 2006); however, de Jongh, Aartman, Parvaneh, and Ilik (2009) used no screening tool or clinical interview, but followed the DSM-IV criteria for BDD.

Vulvo-Vaginal Surgery

One study (Veale, Eshkevari, et al., 2014) was found for the prevalence of BDD in women seeking labiaplasty (n = 49). In this study, prevalence was 18.4%. They used a validated screening questionnaire for this population (Veale et al., 2013) and the BDD-SCID for DSM-IV (Phillips et al., 1995) to diagnose patients with BDD pre and also post-operatively (Veale, Naismith, et al., 2014).

General Dermatology Outpatients

Five studies (n = 914) were found for the prevalence of BDD in general dermatology settings, while two of these studies also investigated prevalence of BDD in cosmetic dermatology settings (n = 301) (Table 11). The range for the prevalence was from 4.2% (Dogruk-Kacar et al., 2014) to 29.4% (Hsu, Ali Juma, & Goh, 2009). The percentage of between-study heterogeneity in this setting, measured by I^2, was considerably higher (87.8%). As this measure of heterogeneity was so high, sensitivity analysis was carried out, and after

excluding the one study (Hsu et al., 2009) that seemed to be a clear outlier, with a prevalence of 29.3% compared to all other studies who reported prevalence < 15%, heterogeneity was reduced, along with I^2 (27.0%). This suggests that this heterogeneity was partly due to outliers.

All five studies used the BDDQ, with four of those five (Calderon et al., 2009; Conrado et al., 2010; Dogruk-Kacar et al., 2014; Hsu et al., 2009) using the version modified for use in dermatology settings (Dufresne et al., 2001). However, only two of the five studies then went on to use the clinician-administered BDD-SCID to diagnose BDD (Conrado et al., 2010; Phillips et al., 2000). Our results suggest a weighted prevalence of BDD in general dermatology outpatient settings of 11.3% (13.4% in females and 14.0% in males, with a ratio of 0.96).

In addition, three of the five included studies also investigated defect severity, using a 5-point scale in which "1" represented no defect/flaw, while "5" represented a severe defect/flaw. Two of these were dermatologist-rated, while one was psychiatrist-rated.

Cosmetic Dermatology Outpatients

Two original studies and three of the studies investigating prevalence of BDD in dermatology settings also reported figures in a cosmetic dermatology clinic (see Table 12). Prevalence of BDD in cosmetic dermatology clinics ranged from 2.9% to 15.2%, with one study (Conrado et al., 2010) stating a much higher prevalence of BDD among women (14.7%) than men (7.1%). Percentage of between-study heterogeneity in this setting, measured by I^2, was non-existent (0.0%). For the five studies investigating prevalence of BDD in cosmetic dermatology clinics, the weighted prevalence was calculated to be 9.2%. As only one study specified numbers of males and females within the sample, the weighted prevalence for each sex could not be calculated.

Three studies used the BDDQ modified for dermatology (BDDQ-DV) (Dufresne et al., 2001) to screen patients for possible BDD, one used the regular BDDQ, and one used the DCQ. Four of the five studies (Castle, Molton, Hoffman, Preston, & Phillips, 2004; Conrado et al., 2010; Dufresne et al., 2001; Phillips et al., 2000) used a SCID to diagnose patients with BDD following this screening process. All five studies also implemented a defect severity scale in order to rule out the presence of those with actual defects in their appearance. In these studies, if patients received a defect severity score of 0-2 (little to no defect) they were classified as being eligible for a BDD diagnosis.

All Cosmetic Surgery and Cosmetic Dermatology Settings

The estimated prevalence for all 23 cosmetic surgery settings was 12.2% (CI 8.4- 17.4). Given the wider range of cosmetic surgery settings a high heterogeneity is expected ($I^2 = 91.1\%$).

Acne Clinics

Two studies were separated from the general dermatology setting as they investigated the prevalence of BDD among those with acne vulgaris (see Table 13). The weighted prevalence of BDD was estimated to be 11.1%.

Both studies implemented a defect severity scale, which were specific skin lesion-related rating scales: the Cook scale (Cook, Centner, & Michaels, 1979), and the Allen & Smith scale (Allen & Smith, 1982), both of which were rated on a 9-point scale (0 = mild skin problems/almost clear skin; 8 = severe skin problems/skin nearly full of lesions). One study screened patients using the BDDQ-DV but did not use a SCID (Bowe, Leyden, Crerand, Sarwer, & Margolis, 2007), while the other did not use a screening questionnaire but did use a SCID (Uzun et al., 2003). A weighted prevalence of 11.1% was calculated for BDD in acne clinics. A

weighted prevalence for males and females could not be calculated as only one study provided details on gender.

Female Ballet Dancers and Male Weight Lifters

One study investigated the prevalence of BDD among female ballet dancers (n = 19) (Nascimento, Luna, & Fontenelle, 2012), and one study among male weight lifters (n = 648) (Nieuwoudt, Zhou, Coutts, & Booker, 2015). As these were the only studies of this kind, weighted prevalence could not be calculated. Prevalence figures for these two populations were similar: 10.5% (CI: 1.7 - 32.6) of female ballet dancers, and 10.6% (CI: 8.5 - 13.3) of male weight lifters. Nascimento et al. (2012) used the somatoform SCID and MINI to diagnose dancers with BDD, while Nieuwoudt et al. (2015) used only the BDDQ to screen for BDD. Neither study used a defect severity scale. Prevalence for eating disorders was 33.8% among male weight lifters while prevalence of panic disorder, generalised anxiety disorder and dysthymic disorder was 10.5% for all.

Discussion

This is the first systematic review on the prevalence of BDD in various settings. We found BDD to have an estimated weighted prevalence of 1.9% of adults in the community and 3.3% in student populations. The prevalence rate rises to 7.4% in psychiatric inpatients and 5.8% in outpatients, where it was under-identified. The prevalence is highest in dermatological settings (11.3%), general cosmetic surgery (13.2%) and rhinoplasty settings (20%). Between-study heterogeneity was highest among cosmetic surgery settings, suggesting that this data is less reliable.

To put the estimates in context, the prevalence of BDD in the community is higher than other body image disorders such as anorexia nervosa or bulimia nervosa (average prevalence of 0.3% and 1% respectively (Hoek, 2006). However, the diagnosis of Other Specified Feeding and Eating Disorders (OSFED), formerly Eating Disorders Not Otherwise Specified (EDNOS) in DSM-IV, tends to be higher than BDD (2.4%) (Solmi, Hotopf, Hatch, Treasure, & Micali, 2015). BDD is however more common than schizophrenia (0.5%) (Saha, Chant, Welham, & McGrath, 2005) but less common than a major depressive episode (prevalence of 6% based on 25 studies and 106,628 participants) (Cuijpers & Smit, 2002). Our estimated prevalence of BDD may be biased upwards as only some of the studies used a diagnostic interview to exclude body dissatisfaction or had an effective method for excluding participants with a noticeable defect. Whatever the true prevalence, BDD appears common in the community but only a small proportion seeks evidence-based treatment. For future research, it would be of interest to know what proportion of those identified in the community have a significant interference in their life, the number who would identify themselves as having BDD, the proportion who have sought help from a mental health professional, a dermatologist, or cosmetic practitioner and the obstacles to seeking help.

Sex Ratio

There was a sex ratio of 1.27 for women to men in the community. In students, there was a ratio of 1.64 for women to men.A greater preponderance of women may reflect the less severe end of the spectrum compared to a specialist psychiatric service, where there tends to be equal sex ratio (Phillips et al., 2006). Of note is that the sex ratio was reversed in general cosmetic surgery settings with the ratio being 0.71 and in rhinoplasty settings the ratio being 0.91. This partly reflects the population having rhinoplasty which is the most common cosmetic procedure

in men in the USA (American Society of Plastic Surgeons, 2014) and where the ratio between women and men is 0.44.

This is in stark contrast to the female to male ratio of 11.5 in those having cosmetic surgery in the USA (American Society of Plastic Surgeons, 2014). This suggests that meeting criteria for BDD is notably higher among male compared to female cosmetic surgery-seekers. Information on sex ratio was missing from the majority of studies in cosmetic dermatology settings. The context is that in the US, Botox injections are the most common minimally invasive cosmetic dermatological procedure, in which 6.2 million women had Botox in 2014 compared to just 411,000 men (American Society of Plastic Surgeons, 2014). Again we may expect a reversal of the sex ratio in BDD in cosmetic dermatology similar to cosmetic surgery settings. Further research is also required on gender in general dermatology settings.

Culture

All the community studies were carried out in either Europe or the USA Thus nothing is known about the prevalence of BDD in under-developed countries and in cultures where cosmetic procedures are popular (for example in Brazil) or in fundamentalist societies where modesty in one's dress is emphasised. Studies in rhinoplasty settings found the highest prevalence figures in studies in Iran and Brazil. However, this data needs to be contextualised in terms of the high popularity of rhinoplasty in these cultures.

Previous research in body dissatisfaction has found differences between countries of low and high socio-economic status (van den Berg, Mond, Eisenberg, Ackard, & Neumark-Sztainer, 2010), and between rural and urban settings (Swami, Kumaraswami, & Furnham, 2011). Swami et al. (2011) concluded body dissatisfaction was highest in America, and suggested that differences may be due to aspects of their environment, for example media exposure. Therefore,

studies in this review may not be representative of the prevalence of BDD in a non-American or Western culture.

Age

The estimate in adolescents (2.2%) has a wide confidence interval as there was only one study and 464 participants. One might expect a higher rate of BDD in young people, when self-consciousness about one's body is highest. However the presentation of BDD in adolescent psychiatric services is less than in adult services (Phillips et al., 2006). Further large prevalence studies are required in schools and colleges with a diagnostic interview to ensure it is possible to differentiate those with body dissatisfaction and body image problems best explained by disordered eating. The estimation of the weighted prevalence of BDD among students of 3.3% is higher than in the community, as might be expected, as students are predominantly young adults who are at greater risk of developing BDD.

None of the studies in students used a structured diagnostic interview, raising the possibility of bias. In addition, these studies did not generally screen for other psychiatric disorders and it is therefore difficult to put the prevalence in context. Further research should aim to investigate the prevalence of BDD through the use of structured clinical interviews after screening, and to understand the proportion of young people whose symptoms of BDD are interfering with their studies or causing them to drop out of their studies, and to assess whether student welfare counsellors are adequately trained to identify BDD and advise on treatment.

Psychiatric settings

The weighted prevalence of BDD in adult and adolescent inpatient settings was 7.4%. However the numbers within each study are small (and therefore there is a wider confidence interval than say studies in the community) but they did all have a structured diagnostic

interview. The majority of patients identified in these inpatient settings had a comorbid diagnosis either of depression, substance misuse or an anxiety disorder, any of which is likely to increase the overall prevalence of BDD. These particular studies do not reflect the prevalence of BDD in many state institutions where there is a much higher prevalence of psychosis. In addition, these studies only reflect the presence of BDD in western hospitals (as all studies were either taken from the USA or Europe). However, there is one consistent finding across the four studies: that clinicians poorly identified BDD. None of the patients revealed their symptoms of BDD during a routine history. This was mainly because of shame or lack of knowledge about BDD or its treatment or a desire to avoid the problem (Veale, Akyüz, et al., 2015). However, further research needs to examine why professionals do not conduct a systematic diagnostic interview: too often it seems that they limit their assessment to the patient's history, a mental state examination and a risk assessment, or they do not use a diagnostic screening questionnaire. Screening for BDD should at least be targeted at those who present with a diagnosis of depression, substance misuse, obsessive-compulsive disorder, or an anxiety disorder. Relatively little investment in training would be required to ensure patients are offered appropriate treatment in both psychiatric in-patients and community settings. One might expect a higher prevalence in adolescent psychiatric settings when there is higher sensitivity about body image and in a western culture where body dissatisfaction is rife. Further research is required in this area and to further understand the reluctance of professionals to screen for BDD in these settings.

The studies conducted in outpatient settings may not be typical of outpatients as two of the three studies were conducted among more specialised populations, in veterans and in an anxiety disorders clinic. The prevalence in psychiatric outpatient or community settings will largely depend on the nature of the population. Like the inpatient settings, it is important to target

the screening for BDD where there is a high proportion of mood, anxiety, obsessive compulsive or eating disorders.

Cosmetic Settings

The prevalence of BDD was highest in cosmetic settings especially rhinoplasty clinics, with prevalence figures varying dramatically. However these settings represent the poorest quality studies with the highest heterogeneity. A defect severity scale was often not used and some studies may therefore be over-diagnosing BDD if there are "noticeable" defects. Equally some patients may not disclose exactly how they feel as they may fear being turned down for surgery. The prevalence may vary widely depending on gender; whether a structured diagnostic interview was used; and nature of the procedures (for example type change procedures like rhinoplasty versus restorative procedures, for example rhytidectomy). The implications of a relatively high prevalence rate are not fully understood are as there are very few studies that follow up after surgery those patients diagnosed with BDD. If the prevalence rate is as high as 13.1% then the most important research is to determine the rate of dissatisfaction and prevalence of BDD after surgery in those diagnosed prospectively. One very small prospective study of patients diagnosed before surgery (Tignol, Biraben-Gotzamanis, Martin-Guehl, Grabot, & Aouizerate, 2007) found that many patients were satisfied with the results but that their symptoms of BDD remained after surgery. Future research may be better targeted at identifying BDD in specific procedures, which may be more risky in say rhinoplasty compared to mammoplasty augmentation or reduction. Whether one can then engage individuals with BDD from a cosmetic setting in an evidence-based treatment is also unknown, as all previous studies have recruited subjects who are seeking help at a specialist psychiatric setting.

Only one study was found within a vulvo-vaginal setting; therefore a weighted

prevalence figure was not calculated. The prevalence from this study was 18.4%; however, the confidence interval was very wide as the sample size was small. The motivation for labiaplasty may be functional (e.g. discomfort), appearance/cosmetic, or sexual dysfunction (Goodman et al., 2010; Veale, Eshkevari, et al., 2014) but the outcome for those with BDD was good (Veale, Naismith, et al., 2014). Further research is required to determine the prevalence of BDD in this setting and its relevance to outcome in the long term.

Importantly there are no large prospective studies in cosmetic surgery settings to determine the degree of risk for outcome in terms of satisfaction or whether the diagnosis of BDD persists especially in those with a single concern and at the milder end of the spectrum. While structured interviews and defect evaluations were often conducted, there was no consistency in the method that this followed. Problems may arise in the inter-rater agreement of defining a perceived "defect". This raises questions about the diagnosis of BDD in all cosmetic settings. For example it may be more helpful to have a standardised assessment of the nose for rhinoplasty (Ifeach, Magarey, & Saleh, 2014) and to evaluate the degree of discrepancy, for example self- compared to clinical-rating, of the perceived defect (Stangier, Hungerbühler, Meyer, & Wolter, 2000) or between self and ideal ratings (Veale, Kinderman, Riley, & Lambrou, 2003) or between self- and a clinical-rating of outcome post-surgery to determine if these or the functional impairment of BDD are better predictors of dissatisfaction and persistence of symptoms of BDD. Clinical ratings of a perceived defect should have a high degree of inter-rater reliability and external validity.

Dentistry

Cosmetic dental clinics found the prevalence of BDD was 5.2%. This is lower than the prevalence in orthognathic surgery settings (11.2%), which seems counterintuitive as cosmetic

dentistry is usually optional and involves procedures designed to improve the appearance of teeth, e.g. veneers, whereas orthognathic surgery involves more invasive procedures which one would associate rather with a physical defect that warrants correction. There is a lack of prevalence studies examining the prevalence of BDD in adolescents undergoing orthodontic work and of outcome in those diagnosed with BDD.

Dermatology

A weighted prevalence of 11.3% in dermatology outpatient clinics was found However, again there was a wide confidence interval (6.0 - 20.2), and heterogeneity was shown to be strongly affected by an outlier study. This may reflect the nature of the setting (e.g. state vs. private), which differ in the types of referrals. There was somewhat more consistency in this setting, with all studies using the BDDQ to screen for BDD (some using the original form and some using the version adapted for dermatology settings). In addition, there was a mix of studies using a structured clinical interview or some form of defect severity scale. Research is required on the implications of the diagnosis for outcome in dermatological treatment.

Threshold for Diagnosis

For all the settings above, there may be a concern about the threshold for a diagnosis of BDD and whether body dissatisfaction is being drawn into a clinical domain. This is a similar concern to other psychiatric disorders, for example the medicalization of normal sadness by turning grief and other life stresses into a major depressive episode (Dowrick & Frances, 2013) or marked shyness into social anxiety disorder (Scott, 2006; Wakefield, Horwitz, & Schmitz, 2005).

Although the boundaries between BDD and “body dissatisfaction” or a noticeable bodily defect(s) can be made reliable by a structured interview and defect severity scales by more than

one interviewer, it does not make a diagnosis more valid. However, there are also concerns about where to draw the line for the prevalence of body dissatisfaction using the Multidimensional Body-Self Relations Questionnaire (MBSRQ: Cash (2000)). Various studies estimate body dissatisfaction to be between 13.4% - 31.8% among women and 9.0% - 28.4% among men depending on the criterion used (Fallon, Harris, & Johnson, 2014) or 34% in men and 38% in women (Cash & Henry, 1995) and 43% in men and 56% in women (Garner, 1997).

Limitations

A weighted prevalence provides greater weighting to studies with larger numbers and does not take into account the quality of the study. Due to the high heterogeneity especially within cosmetic settings, therefore, there are limitations with regard to the calculation of the weighted prevalence and setting of the boundary for BDD. The heterogeneity may be due to the method of screening or diagnosis or the location of each study. Better research is required to ensure a diagnosis is made with a structured diagnostic interview with inter-rater reliability and agreed instruments for a "defect" especially in cosmetic settings.

Conclusions

We noted in the introduction that large catchment area surveys of psychiatric epidemiology have generally ignored screening for BDD. However, our review has found that the surveys of BDD have sometimes ignored screening for other psychiatric morbidity. This sometimes makes it difficult to put the estimated prevalence in context. It is to be hoped that this will change in future as BDD is now more recognized and is an integral part of the obsessive compulsive and related disorders section of DSM5 (American Psychiatric Association, 2013) and ICD-11 (Veale & Matsunaga, 2014).

Our conclusion is that BDD remains a hidden but common disorder with many people not

seeking help or seeking help inappropriately. The design of many of the studies could be improved upon, especially in cosmetic settings. Further research is required on increasing awareness of BDD and its identification in settings where there is a high risk of BDD.

Health professionals are often not confident enough to diagnose and treat BDD. Due mainly to shame, it is under-reported and then under-diagnosed. A patient must pass several obstacles in the successful diagnosis and treatment of their BDD. There is still a low level of awareness and understanding about BDD amongst the public and health professionals. As a result, detection rates are low. The second obstacle is that when people with BDD do seek help they are more likely to present in a dermatological, cosmetic or orthognathic setting than a psychiatric one. Here the prevalence ranged from 9.2 to 20.1%. When someone with BDD obtains obtain help from a mental health professional, they may be too ashamed to reveal their main symptoms and present with symptoms of depression, social phobia, or obsessive-compulsive disorder (for which there is frequent comorbidity). In these settings, the prevalence rose to 7.4%. When sufferers are finally diagnosed with BDD, 10-15 years after the onset (Phillips, Menard, Fay, & Weisberg, 2005; Veale, Boocock, et al., 1996), they may then be treated inappropriately with counselling or antipsychotic drugs.

Whilst awareness of the condition in the general public may improve over time, it is still a major obstacle for an individual with BDD to reveal their symptoms even when it is their biggest problem. Thus, in psychiatric settings it is the responsibility of the mental health professional to screen for BDD just as they ask about alcohol or plans for suicide – issues which patients may not volunteer in their history. Further research needs to understand why professionals do not conduct a broader diagnostic interview especially when there is a presentation of depression, substance misuse or social anxiety – too often an assessment is

limited to a patient's history, mental state examination and risk assessment. Patients may continue to be treated inappropriately if screening is not done for BDD and no attempt is made to engage a patient in CBT which is specific to BDD (Veale, Anson, et al., 2014; Veale, Gournay, et al., 1996; Wilhelm et al., 2014) or offer a SSRI in the maximum tolerated dose (Phillips, Albertini, & Rasmussen, 2002).

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Figure 1.
Search strategy employed using Embase, Ovid Medline, and PsychInfo databases

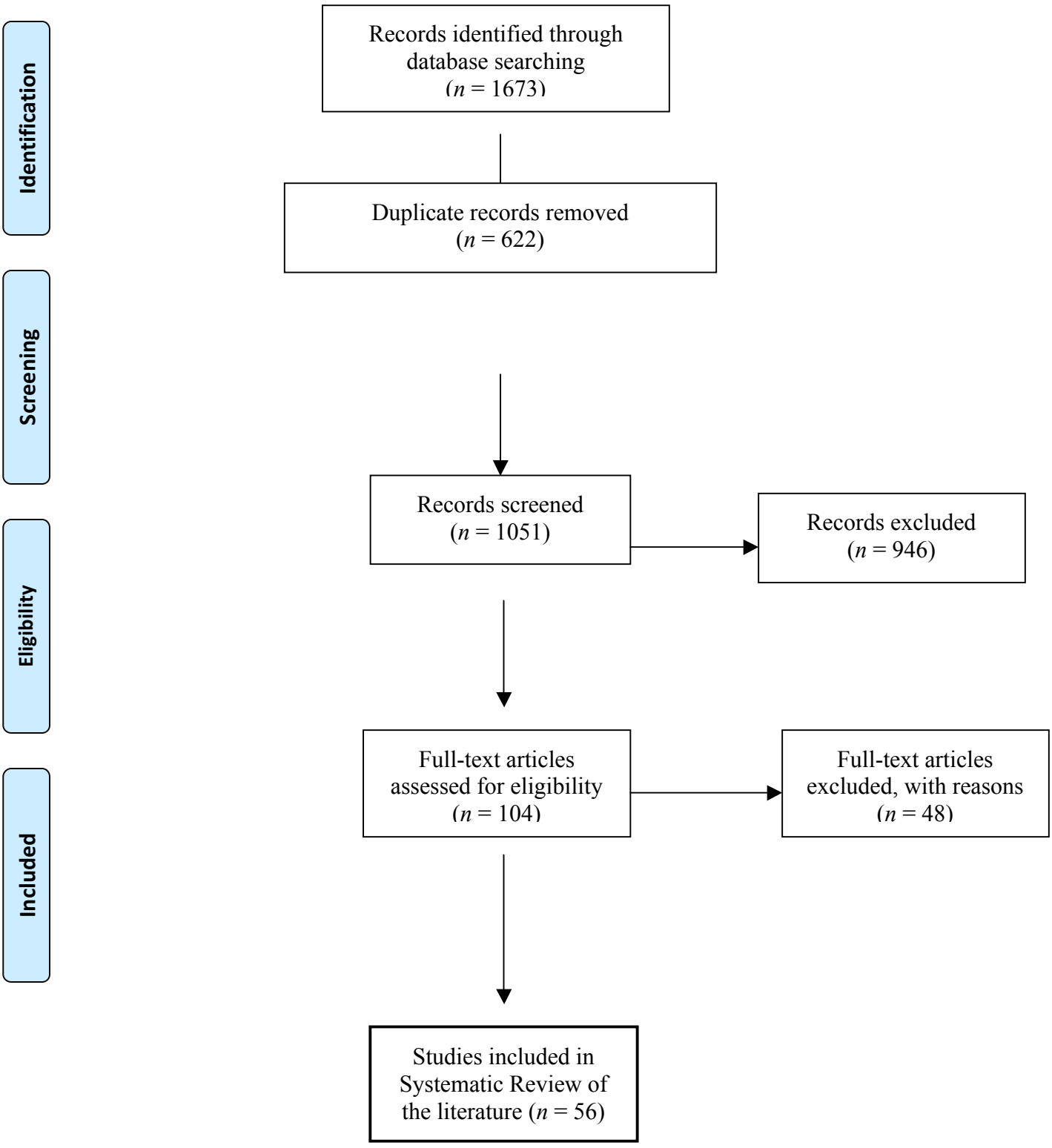

Table 1.
Search conducted using Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R): 1946 to Present, Embase: 1974 to 2015 July 06, and PsycINFO: 1806 to June Week 5 2015. Authors searched through articles that contained search terms from both stage 1 and 2, i.e. 1,672 articles.

Stage	Search terms	Result
1	epidemiology OR epidemiologic studies OR incidence OR prevalence OR occur* OR frequenc* OR proportion* OR rate* OR number* OR percent*	**15249547**
2	body dysmorphic disorder.sh. OR body dysmorphi$ OR dysmorphophobi$ OR imagine$ ugl$	**4718**
3	1 AND 2	**1672**
4	Duplicates removed	**622**

Table 2. *Prevalence of BDD in adults in the community*

Reference	Location *(Recruitment period)*	BDD screening tool	Interview	Age *mean* (*SD*) *range*	Participants			*n* (%) with BDD [CI (95%)]			Other disorders
					Total	Male	Female	Total	Male	Female	
Faravelli et al. (1997)	Italy *(April - Sept. 1990)*	None	"Flow chart interview following the DSM-III decision tree"	-	673	304	369	5 (0.7%) [0.3, 1.8]	0 (0.0%) [0.0, 1.5]	5 (1.4%) [0.5, 3.2]	Mood dis: 84(12.2%) BPA dis: 1 Dysthymia: 46(6.8%) Cyclothymia: 9(1.3%) MDD: 28(4.2%) Panic with ag: 3(0.4%) Panic without ag:18 (2.7%) Agoraphobia without panic: 1 Simple phobia: 2 (0.3%) GAD: 3 (0.4%).
Otto et al. (2001)	USA *(point prevalence-no year given)*	None	SCID-P for DSM-IV	36-44	-	0	976 female only	-	-	8 (0.8%) [0.4, 1.6]	Anxiety dis: 211(21.6%) MDD: 318(32.6%).
Rief, Buhlmann, Wilhelm, Borkenhagen, and Brahler (2006)	Germany *(Sept. - Oct. 2004)*	Two surveys assessing DSM-IV-TR criteria for BDD	No interview	47.6 (18.0) 14-99	2552	906	1346	43 (1.7%) [1.3, 2.3]	17 (1.9%) [1.2, 3.0]	26 (1.9%) [1.3, 2.8]	-

Koran, Abujaoude, Large, and Serpe (2008)	USA *(Spring - Summer 2004)*	Some questions from BDDQ	No interview	-	2048	739	1309	49 (2.4%) [1.8, 3.2]	16 (2.2%) [1.3, 3.5]	33 (2.5%) [1.8, 3.5]	-
Buhlmann et al. (2010)	Germany *(May - June 2007)*	Two surveys assessing DSM-IV-TR criteria for BDD	No interview	46.9 (18.4) 14-93	2510	1215	1295	45 (1.8%) [1.3, 2.4]	17 (1.4%) [0.9, 2.3]	28 (2.2%) [1.2, 2.8]	-
Brohede, Wingren, Wijma, and Wijma (2015)	Sweden *(Oct. - Nov. 2009)*	BDDQ (Swedish v.)	No interview	18-60	-	0	2885 female only	-	-	61 (2.1%) [1.7, 2.7]	Depression: 287 (9.9%) Anxiety: 927 (32.1%)
Schieber et al. (2015)	Germany *(May - June 2011)*	DCQ (DCQ score >9 = dysmorphic concerns) Patient listed and rated their own flaws	DSM-IV diagnostic criteria DSM-5 diagnostic criteria	45.3 (13.0) 18-65	2129	976	1153	DSM-IV: 68 (3.2%) [2.5, 4.0] DSM-5: 62 (2.9%) [2.3, 3.7]	17 (1.7%) [1.1, 2.8] 13 (1.3%) [0.8, 2.3]	51 (4.4%) [3.4, 5.8] 49 (4.3%) [3.2, 5.6]	-
			Total	-	9912	4140	9333	210	67	212	

Weighted prevalence		1.9% [1.4, 2.7]	1.6% [1.3, 2.1]	2.1% [1.5, 2.9]
	Z	-22.36**	-21.54**	-33.25**
	χ^2	8.89**	15.57**	0.00
	τ^2	0.11	0.17	0.00
	I^2	55.0%	61.4%	0.0%

*note: Female-only studies were not included in the total weighted prevalence figure. Flow chart interview (Faravelli, Degl' Innocenti, & Giardinelli, 1989); BDDQ = Body Dysmorphic Disorder Questionnaire (Phillips, 1996); BDDQ-Swedish Version (Brohede et al., 2013); DCQ = Dysmorphic Concern Questionnaire (Oosthuizen et al., 1998); SCID-I/P for DSM-IV = Structured Clinical Interview for DSM-IV patient version (First, Spitzer, Gibbon, & Williams, 1995b); DSM = Diagnostic and Statistical Manual for Mental Disorders – 4th edition (American Psychiatric Association, 1994), - 4th edition-revised (American Psychiatric Association, 2000), - 5th edition (American Psychiatric Association, 2013); χ^2 = Chi square statistic for likelihood ratio test comparing random vs. fixed effect model; Z = test of whether prevalence differs from 0; τ^2 = between-study variance of prevalence; I^2 = percentage of between study variance which is due to heterogeneity rather than chance; ** $p \leq .001$; * $p \leq .05$.*

Table 3.
Prevalence of BDD in students

Reference	Location *(Type of student)*	BDD screening tool	Interview	Age *mean* (*SD*) *range*	Participants			*n* (%) with BDD [CI (95%)]		
					Total	Male	Female	Total	Male	Female
Bohne, Keuthen, et al. (2002)	USA	BDDQ	No interview	21.0 (2.4) 17-29	101	18	83	4 (4.0%) [1.2, 10.1]	2 (11.1%) [1.9, 34.1]	2 (2.4%) [0.2, 8.9]
Bohne, Wilhelm, et al. (2002)	Germany (*Psychology*)	BDDQ (German v.)	No interview	22.0 (3.5) 19-37	133	35	98	7 (5.3%) [2.4, 10.7]	2 (5.7%) [0.6, 19.6]	5 (5.1%) [1.9, 11.7]
Cansever et al. (2003)	Turkey *(Nursing)*	Items from the BDDE	BDD-SCID for DSM-IV (Turkish v.)	19.1 (±1.0) 17-23	-	-	420 female only	-	-	20 (4.8%) [3.1, 7.3]
Sarwer et al. (2005)	USA	BDDQ	No interview	20.5 (±3.6)	-	-	559 female only	-	-	14 (2.5%) [1.5, 4.2]
Bartsch (2007)	Australia	BDDQ DCQ	No interview	26.1 17-65	619	169	450	14 (2.3%) [1.3, 3.8]	2 (1.2%) [0.1, 4.5]	12 (2.7%) [1.5, 4.7]

Taqui et al. (2008)	Pakistan (*Medicine*)	Adapted version of BIDQ for DSM-IV	No interview	Male: 20.8 (±2.0) Female: 20.5 (±1.8)	156	67	89	9 (5.8%) [2.9, 10.7]	5 (7.5%) [2.9, 16.7]	4 (4.5%) [1.4, 11.4]
Boroughs et al. (2010)	USA	BDDE-SR	No interview	21.0 (4.2) 18-56	1041	344	697	51 (4.9%) [3.7, 6.4]	8 (2.3%) [1.1, 4.6]	43 (6.2%) [4.6, 8.2]
Liao et al. (2010)	China (*Medicine*)	BDDQ DCQ	No interview	18.5 (±0.8) 16-21	487	181	306	6 (1.2%) [0.5, 2.7]	0 (0.0%) [0.0, 2.5]	6 (2.0%) [0.8, 4.3]
			Total	-	2537	814	2702	91	19	106
			Weighted prevalence					3.3% [2.0, 5.3]	2.2% [0.7, 6.2]	3.6% [2.6, 5.0]
							Z	-13.42**	-19.19**	-6.82**
							χ^2	8.87**	6.25**	4.89*
							τ^2	0.23	0.11	1.09
							I^2	43.6%	0.0%	0.0%

note: no studies investigated prevalence of any other disorder in these patients. Female-only studies were not included in the total weighted prevalence figure. No information given about time period of prevalence figure.

BDDQ = Body Dysmorphic Disorder Questionnaire (Phillips, 1996); BDDQ-German Version (Phillips et al., 1995); BDDE = Body Dysmorphic Disorder Evaluation (Rosen & Reiter, 1996); BDD-SCID for DSM-IV, Turkish version = Body Dysmorphic Disorder module of the Structured Clinical Interview for DSM-IV, Turkish version

(Corapcıoglu, Aydemir, Yildiz, Esen, & Koroglu, 1999); DCQ = Dysmorphic Concern Questionnaire (Oosthuizen et al., 1998); BDDE-SR = Body Dysmorphic Disorder Examination- Self Report version (Rosen & Reiter, 1995); BIDQ = Body Image Disturbance Questionnaire (Cash et al., 2004); BDD-SCID = Structured Clinical Interview for Body Dysmorphic Disorder (Phillips et al., 1995); DSM-IV = Diagnostic and Statistical Manual for Mental Disorders 4th Edition (American Psychiatric Association, 1994); χ^2 = Chi square statistic for likelihood ratio test comparing random vs. fixed effect model; Z = test of whether prevalence differs from 0; τ^2 = between-study variance of prevalence; I^2 = percentage of between study variance which is due to heterogeneity rather than chance; $^{**}p \leq .001$; $^{*}p \leq .05$.

Table 4.
Prevalence of BDD in an adult psychiatric inpatient setting

Reference	Location *(Recruitment period)*	BDD screening tool	Interview	Participants			*n* (%) with BDD [CI (95%)]			Other disorders
				Total	Male	Female	Total	Male	Female	
Grant et al. (2001)	USA ***	BDDQ	BDD-SCID for DSM-IV	101	50	51	13 (12.9%) [7.5, 20.9]	6 (12.0%) [5.3, 24.2]	7 (13.7%) [6.5, 26.0]	Psychotic dis: 20 (16.4%); mood dis: 92 (75.4%); substance use dis: 62 (50.8%); anxiety dis: 6 (4.9%); somatoform: 1 (0.8%); EDs: 9 (7.4%); adjustment dis: 2 (1.6%); impulse-control dis: 6 (4.9%); ADHD: 2 (1.6%); other: 5 (4.1%).
Conroy et al. (2008)	USA ***	BDDQ Defect severity scale (1-5)	BDD-SCID for DSM-IV (SCID-I/P, v. 2.0)	100	33	67	16 (16.0%) [10.0, 24.5]	5 (15.2%) [6.2, 31.4]	11 (16.4%) [9.3, 27.2]	Unipolar mood dis: 55.0%; bipolar dis: 21.0%; psychotic disorder: 15.0%; anxiety dis: 3.0%; substance use dis: 2.0%; EDs: 2.0%; adjustment dis: 1.0%; BPD: 1.0%.
Kollei et al. (2011)	Germany ***	Psychiatrist-rated defect severity scale (0-10)	BDD-SCID for DSM-IV (German v.)	155	60	95	3 (1.9%) [0.4, 5.8]	0 (0.0%) [0.0, 6.0]	3 (3.2%) [0.7, 9.3]	Psychotic dis: 12 (7.7%); mood dis: 69 (44.5%); substance use dis: 16 (10.3%); anxiety dis: 25 (16.1%); somatoform: 3 (1.9%); EDs: 14 (9.0%); PDs: 12 (7.7%); impulse-control dis: 1 (0.6%); ADHD: 1 (0.6%); other: 1 (0.6%).
Veale, Akyüz, et	UK *(13 month*	One screening question	BDD-SCID-I for DSM-IV	432	208	224	25 (5.8%)	9 (4.3%)	16 (7.1%)	Psychotic dis: 18 (4.2%); mood dis: 186 (43.0%); substance use dis: 162 (37.5%); anxiety dis: 49

al. (2015)	*period - 2013)*				[3.9, 8.4]	[2.2, 8.1]	[4.4, 11.4]	(11.3%); eating dis: 2 (0.5%); adjustment dis: 8 (1.9%); personality dis: 4 (0.9%); other: 3 (0.7%).
		Total	788	351	437	57	20	37	
		Weighted prevalence				7.4% [3.5, 15.0]	5.6% [2.0, 14.7]	9.6% [4.9, 18.0]	
					Z	-6.22**	-6.10**	-5.22**	
					χ^2	10.99**	5.21*	3.14*	
					τ^2	0.55	0.40	0.77	
					I^2	72.6%	4.5%	42.4%	

note: *** = no information available about time period of prevalence.
*BDDQ = Body Dysmorphic Disorder Questionnaire (Phillips, 1996); BDD-SCID for DSM-IV -German Version (Wittchen, Wunderlich, Gruschwitz, & Zaudig, 1997); BDD-SCID for DSM-IV = Body Dysmorphic Disorder module of the Structured Clinical Interview for DSM-IV (Phillips et al., 1995); SCID-I/P v 2.0 = Structured Clinical Interview for DSM-IV axis 1 disorder- Patient edition (First, Gibbon, & Spitzer, 1996); χ^2 = Chi square statistic for likelihood ratio test comparing random vs. fixed effect model; Z = test of whether prevalence differs from 0; τ^2 = between-study variance of prevalence; I^2 = percentage of between study variance which is due to heterogeneity rather than chance; ** $p \leq .001$; * $p \leq .05$.*

Table 5.
Prevalence of BDD in an adolescent psychiatric inpatient setting

Reference	Location	BDD screening tool	Interview	Participants			*n* (%) with BDD [CI (95%)]			Other disorders
				Total	Male	Female	Total	Male	Female	
Grant et al. (2001)	USA	BDDQ	BDD-SCID for DSM-IV	21	7	14	3 (14.3%) [4.1, 35.5]	0 (0.0%) [0.0, 40.4]	3 (21.4%) [6.8, 48.3]	-
Dyl et al. (2006)	USA	BDDQ for adolescents	No interview	208	78	130	14 (6.7%) [4.0, 11.1]	7 (9.0%) [4.2, 17.7]	7 (5.4%) [2.4, 10.9]	Bipolar: 84 (40.4%); MDD/Dysthymic: 82 (39.4%); Oppositional Defiant Disorder/Conduct Dis: 40 (19.2%); PTSD/Acute Stress Dis: 32 (15.4%); Anxiety Dis: 20 (9.6%); ADHD: 25 (12.0%); Psychotic Dis: 7 (3.4%); Other: 17 (8.2%).
			Total	229	85	144	17	7	10	
			Weighted prevalence				7.4% [4.7, 11.6]	3.5% [1.1, 10.4]	6.9% [3.8, 12.4]	
						Z	-10.01**	-7.92**	-5.63**	
						χ^2	-	-	-	
						τ^2	-	-	-	

note: no information available about time period of prevalence. *BDDQ = Body Dysmorphic Disorder Questionnaire (Phillips, 1996); BDD-SCID = Structured Clinical Interview for Body Dysmorphic Disorder (Phillips et al., 1995);* χ^2 *= Chi square statistic for likelihood ratio test comparing random vs. fixed effect model; Z = test of whether prevalence differs from 0;* τ^2 *= between-study variance of prevalence;* $^{**}p \leq .001$; $^{*}p \leq .05$.

Table 6.
Prevalence of BDD in an adult psychiatric outpatient setting

Reference	Location *(Recruitment period)*	BDD screening tool	Interview	Participants			*n* (%) with BDD [CI (95%)]			Other disorders
				Total *(type)*	Male	Female	Total	Male	Female	
Wilhelm et al. (1997)	USA ***	-	BDD-SCID-OP for DSM-IV	165 *(anxiety disorder patients)*	81	84	11 (6.7%) [3.6, 11.7]	4 (4.9%) [1.6, 12.4]	7 (8.3%) [3.8, 16.5]	Primary diagnoses: panic with/without agoraphobia (80) + BDD (3); OCD (40) + BDD (3); social phobia (25) + BDD (3); GAD (20) + BDD (2)
Zimmerman and Mattia (1998)	USA ***	PDSQ (self-report questionnaire)	BDD-SCID for DSM-IV	500 *(general psychiatric outpatients)*	198	302	16 (3.2%) [1.9, 5.2]	4 (2.0%) [0.6, 5.3]	12 (4.0%) [2.2, 6.9]	BDD = additional diagnosis for 13 (2.6%): MDD (7), social phobia (1), panic disorder with agoraphobia (1), PTSD (1), dysthymic disorder (1), and eating and depressive disorder NOS (1 each).
Kelly et al. (2015)	USA *(Aug. 2009 - June 2011)*	BDDQ Psychiatrist-rated defect severity scale (1-5)	BDD- SCID-I/P for DSM-IV: patient v.	100 *(Veterans)*	94	6	11 (11.0%) [6.1, 18.8]	9 (9.6%) [4.9, 17.4]	2 (33.3%) [9.2, 70.4]	Mood disorder or MDD, followed by substance use disorder = most common.
			Total	765	373	392	38	17	21	

Weighted prevalence		5.8% [3.2, 10.4]	4.6% [2.1, 9.7]	6.5% [2.6, 15.6]
	Z	-8.64**	-5.36**	-7.39**
	χ^2	3.83**	0.38	2.26
	τ^2	0.22	0.17	0.30
	I^2	47.7%	11.3%	0.0%

note: *** = no information given about time period of prevalence.
*PDSQ = the Psychiatric Diagnostic Screening Questionnaire (Zimmerman & Mattia, 2001); BDD-SCID for DSM-IV = Body Dysmorphic Disorder module of the Structured Clinical Interview for DSM-IV (First, Spitzer, Gibbon, Williams, & Benjamin, 1997) ; BDDQ = Body Dysmorphic Disorder Questionnaire (Phillips, 1996); SCID-I/P for DSM-IV = Structured Clinical Interview for DSM-IV patient version (First et al., 1995b);BDD-SCID-OP = Body Dysmorphic Disorder module of the Structured Clinical interview for DSM-IV- outpatient version (Spitzer, Williams, & Gibbon, 1988); χ^2 = Chi square statistic for likelihood ratio test comparing random vs. fixed effect model; Z = test of whether prevalence differs from 0; τ^2 = between-study variance of prevalence; I^2 = percentage of between study variance which is due to heterogeneity rather than chance; ** $p \leq .001$; * $p \leq .05$.*

Table 7.
Prevalence of BDD in general cosmetic surgery clinics

Reference	Location *(Recruitment period)*	BDD screening tool	Interview	Participants			*n* (%) with BDD [CI 95%]			Most common procedures/ location of procedures sought	Other disorders
				Total	Male	Female	Total	Male	Female		
Ishigooka et al. (1998)	Japan *(Jan. 1980-June 1997)*	-	Psychiatric interview using ICD-10 criteria	415	130	285	64 (15.4%) [12.3, 19.2]	43 (33.1%) [25.6, 41.6]	19 (6.7%) [4.3, 10.2]	Facial surgeries	Schizophrenia: 17 (4.1%); depression: 33 (8%); neurotic dis: 47 (11.3%); hypochondriacal dis: 42 (10.1%); paranoid PD: 5 (1.2%); histrionic PD: 14 (3.4%); other: 20 (4.8%).
Sarwer, Wadden, et al. (1998)	USA ***	BDDE-SR MBSRQ Surgeon-rated defect severity scale	No interview	-	0	100 female only	-	-	7 (7.0%) [3.2, 14.0]	face lift, blepharoplasty, breast reduction, rhinoplasty, liposuction	-
Altamura et al. (2001)	Italy ***	-	BDD-YBOCS	478	114	364	30 (6.3%)	4 (3.5%)	26 (7.1%)	face, nose, genitals, hair,	Mood dis: 69 (14.4%); OCD:

			BDD-SCID-I for DSM-IV				[4.4, 8.9]	[1.1, 9.0]	[4.9, 10.3]	legs, abdomen	60 (12.6%); somatoform dis: 53 (11.1%); EDs: 42 (8.8%); social phobia: 31 (6.5%).
Vargel & Uluşahin (2001)	Turkey ***	MBSRQ SCL-90-R	0.5hr interview by first author using DSM-IV criteria for BDD	20	7	13	4 (20.0%) [7.5, 42.2]	2 (28.6%) [7.6, 64.8]	2 (15.4%) [3.1, 43.5]	rhinoplasty, facial surgery, otoplasty, abdomino-reconstruction, mammoplasty	yes, but no prevalence given.
Vindigni et al. (2002)	Italy *(Feb. - Dec. 2001)*	BDDE	SCID II for DSM-IV MINI (Italian v.)	56	11	45	30 (53.6%) [40.7, 66.0]	5 (45.5%) [21.3, 72.0]	25 (55.6%) [41.2, 69.1]	septorhinoplasty	yes, all axis I and II disorders, but prevalence only given for BDD group, i.e. comorbidities.
Aouizerate et al. (2003)	France ***	Surgeon-rated defect severity scale (1-4)	MINI v. 4.4 BDD-SCID II for DSM-IV	132	8	124	12 (9.1%) [5.2, 15.4]	2 (25.0%) [6.3, 59.9]	10 (8.1%) [4.3, 14.4]	skin, nose, breast, legs/knees	yes, all axis I disorders, but prevalence only given for BDD group, i.e. comorbidities.
Bellino et al. (2006)	Italy *(Oct. 2001 - July 2003)*	-	BDD-YBOCS BDD-SCID for DSM-IV (Italian v.)	66	9	57	11 (16.7%) [9.4, 27.6]	3 (33.3%) [11.7, 64.9]	8 (14.0%) [7.0, 25.6]	blepharoplasty, liposuction, rhinoplasty, abdominoplasty, otoplasty	Anxiety dis: 17 (25.8%); mood dis: 10 (15.2%); also assessed for axis II disorders but no

											prevalence given.
Pavan et al. (2006)	Italy *(Dec. 2003 - Oct. 2004)*	-	MINI 5.0 (Italian v.)	27	4	23	10 (37.0%) [21.5, 55.8]	2 (50.0%) [15.0, 85.0]	8 (34.8%) [18.7, 55.2]	rhinoplasty, mammoplasty	MDD = most common: 14 (51.9%)
Lai, Lee, Yeh, and Chen (2010)	Taiwan *(Jan. 2006 - Dec. 2008)*	-	DSM-IV-TR to diagnose BDD	763	92	671	54 (7.1%) [5.4, 9.1]	7 (7.6%) [3.5, 15.1]	47 (7.0%) [5.3, 9.2]	blepharoplasty, scar revision, rhinoplasty, mammoplasty, facelift, liposuction	-
Veale, Naismith, et al. (2014)	UK *(Jan. 2010 - May 2012)*	COPS-L BIQLI	BDD-SCID for DSM-IV	-	0	49 female only	-	-	9 (18.4%) [9.8, 31.6]	Labiaplasty only	-
Dey et al. (2015)	USA *(March - June 2014)*	BDDQ Surgeon-rated defect severity scale (1-5)	BDD-SCID for DSM-IV-TR	234	77	157	18 (7.7%) [4.9, 11.9]	6 (7.8%) [3.3, 16.3]	12 (7.6%) [4.3, 13.0]	nose, skin, hair, chin, ears	-
			Total	2191	452	1888	238	74	173		
			Weighted prevalence				13.2% [7.2, 22.9]	15.3% [7.9, 27.3]	10.9% [5.8, 19.7]		
						Z	-5.51**	-5.94**	-4.57**		

χ^2	80.62**	82.07**	8.92*
τ^2	0.95	1.22	0.79
I^2	90.0%	10.0%	87.8%

note: Female-only studies were not included in the total weighted prevalence figure.*** = no information given about time period of prevalence figure.
*ICD-10 = International Classification of Diseases vs. 10 (World Health Organization, 1992); BDDE = Body Dysmorphic Disorder Evaluation (Rosen & Reiter, 1996);BDDE-SR = Body Dysmorphic Disorder Evaluation- Self Report version (Rosen & Reiter, 1995); MBSRQ = Multidimensional body-self rating questionnaire (Brown, Cash, & Mikulka, 1990); BDD-YBOCS = Yale Brown Obsessive Compulsive Scale modified for Body Dysmorphic Disorder (Phillips et al., 1997); BDD-SCID = Body Dysmorphic Disorder module of the Structured Clinical Interview for DSM-IV (Phillips et al., 1995); SCID II 2.0 (Phillips, 1996); SCL-90-R (Turkish version) = Symptom Checklist Revised (Dag, 1991); DSM-IV (American Psychiatric Association, 1994), - 4th edition revised (American Psychiatric Association, 2000); BDD-SCID for DSM-IV (Italian Version) (Mazzi, Morosini, De Girolamo, Lussetti, & Guaraldi, 2000); BDD-SCID for DSM-IV-TR = Body Dysmorphic Disorder module of the Structured Clinical Interview for DSM-IV-TR (First, Spitzer, Gibbon, & Williams, 2002); MINI = International Neuropsychiatric Interview (Sheehan et al., 1998); MINI- Italian version (Rossi et al., 2004); COPS-L = Cosmetic Procedure Scale- Labiaplasty (Veale et al., 2013); BDDQ = Body Dysmorphic Disorder Questionnaire (Phillips, 1996); χ^2 = Chi square statistic for likelihood ratio test comparing random vs. fixed effect model; Z = test of whether prevalence differs from 0; τ^2 = between-study variance of prevalence; I^2 = percentage of between study variance which is due to heterogeneity rather than chance; ** $p \leq .001$; * $p \leq .05$.*

Table 8.
Prevalence of BDD in those seeking Rhinoplasty surgery

Reference	Location *(Recruitment period)*	BDD screening tool	Interview	Participants			*n* (%) with BDD [CI 95%]			Other disorders
				Total	Male	Female	Total	Male	Female	
Veale, De Haro, et al. (2003)	UK ***	BDDQ Patient-rated nose imperfection scale (0-8)	BDD-YBOCS	29	7	22	6 (20.7%) [9.5, 38.8]	Missing	Missing	Anxiety & depression, but no prevalence given.
Alavi et al. (2011)	Iran *(Aug. 2007 - Jan. 2008)*	-	DSM IV-TR criteria for BDD used in interview	306	61	245	75 (24.5%) [20.0, 29.6]	Missing	Missing	OCD: 63 (20.6%); AN: 3 (1.0%); SAD: 4 (1.3%); somatic delusion: 4 (1.3%); gender identity disorder: 13 (4.2%)
Ghadakzadeh et al. (2011)	Iran *(Jan. 2008 - Sept. 2009)*	BICI-SR (Persian v.) Surgeon-rated nose defect scale (1-2)	Semi-structured interview for BDD (DSM-IV criteria).	104	15	89	31 (29.8%) [21.8, 39.2]	6 (40%) [19.8, 64.3]	25 (28.1%) [19.8, 38.2]	Those with other psych. disorders were excluded.
Constantian (2012)	USA *(July 2007 - Oct. 2008)*	Surgeon-rated nose deformity scale (1-5)	DSM-IV Criteria	150	29	121	3 (2.0%) [0.4, 6.0]	1 (3.5%) [0.0, 18.6]	2 (1.7%) [0.1, 6.2]	Depression: 40 (26.7%)

Picavet et al. (2012)	Belgium *(April 2009 - Dec. 2010)*	Surgeon-rated nasal deformity rating (0-25)	BDD-YBOCS DSM IV-TR criteria for BDD	166	71	95	3 (1.8%) [0.4, 5.4]	Missing	Missing	-
Fathololoomi et al. (2013)	Iran *(Oct. 2010 - Oct. 2011)*	-	Interviewed with 4-item BDD questionnaire	130	31	99	41 (31.5%) [24.2, 40.0]	8 (25.8%) [13.5, 43.5]	33 (33.3%) [24.8, 43.1]	Anxiety & depression, but prevalence only given for BDD group, i.e. comorbidities.
Felix et al. (2014)	Brazil *(Sept. 2009 - Aug. 2010)*	BDDE (Brazilian-Portuguese v.) Surgeon-rated nasal defect scale (1-2)	"Clinical interview assessing BDD"	-	0	116 female only	-	-	31 (26.7%) [19.5, 35.5]	-

Total	885	214	787	246	15	91
Weighted prevalence				20.1% [9.9, 36.7]	18.4% [5.9, 44.8]	16.7% [5.3, 41.7]
			Z	-3.25**	-2.47**	-2.28*
			χ^2	52.89**	38.32**	3.40*
			τ^2	0.98	1.57	0.91
			I^2	90.5%	41.1%	92.2%

note: Female-only studies were not included in the total weighted prevalence figure. *** = no information given about time period of prevalence.
*BDDQ = Body Dysmorphic Disorder Questionnaire (Phillips, 1996); BDD-YBOCS = Yale Brown Obsessive Compulsive Disorder Scale modified for BDD (Phillips et al., 1997); DSM-IV-TR = Diagnostic and Statistical Manual for Mental Disorders - 4th Edition revised (American Psychiatric Association, 2000), - 4th Edition (American Psychiatric Association, 1994); BICI-SR = Body Image Concern Inventory, self-report version (Littleton et al., 2005); SCID for DSM-IV = Semi structured Interview for DSM-IV (First et al., 1995a); BDDE-Brazilian-Portuguese Version = Body Dysmorphic Disorder Evaluation- Brazilian-Portuguese Version (Jorge et al., 2008); χ^2 = Chi square statistic for likelihood ratio test comparing random vs. fixed effect model; Z = test of whether prevalence differs from 0; τ^2 = between-study variance of prevalence; I^2 = percentage of between study variance which is due to heterogeneity rather than chance; ** $p \leq .001$; * $p \leq .05$.*

Table 9.
Prevalence of BDD in those seeking Orthognathic surgery

Reference	Location *(Recruitment period)*	BDD screening tool	Interview	Participants			*n* (%) with BDD [CI 95%]			Other disorders
				Total	Male	Female	Total	Male	Female	
Vulink et al. (2008)	Netherlands *(Sept. 2005 - March 2007)*	Nine questions from BDDQ, 11 from BDDE. Surgeon-rated defect severity scale (1-4)	DSM-IV criteria for BDD	160	54	106	16 (10.0%) [6.2, 15.7]	5 (9.3%) [3.6, 20.3]	11 (10.4%) [5.7, 17.8]	-
Collins et al. (2014)	USA *(May 2010 - June 2013)*	BIDQ	No interview	99	46	53	13 (13.1%) [7.7, 21.3]	3 (6.5%) [1.6, 18.2]	10 (18.9%) [10.4, 31.6]	OCD: 29 (29.3%); MDD: 16 (16.2%); anxiety: 23 (23.2%).
			Total	259	100	159	29	8	21	
			Weighted prevalence				11.2% [7.9, 15.6]	8.0% [4.1, 15.2]	13.2% [8.8, 19.4]	
						Z	-10.51**	-8.04**	-6.63**	
						χ^2	-	-	-	
						τ^2	-	-	-	

note: BDDQ = Body Dysmorphic Disorder Questionnaire (Phillips, 1996); BDDE = Body Dysmorphic Disorder Evaluation (Rosen & Reiter, 1996); DSM-IV = Diagnostic and Statistical Manual for Mental Disorders 4th Edition (American Psychiatric Association, 1994); BIDQ = Body Image Disturbance Questionnaire (Cash et al., 2004); χ^2 = Chi square statistic for likelihood ratio test comparing random vs. fixed effect model; Z = test of whether prevalence differs from 0; τ^2 = between-study variance of prevalence; ** $p \leq .001$; * $p \leq .05$.

Table 10.
Prevalence of BDD in those seeking Orthodontics/Cosmetic dentistry

Reference	Location *(Recruitment period)*	BDD screening tool	Interview	Participants			*n* (%) with BDD [CI 95%]		
				Total	Male	Female	Total	Male	Female
Hepburn and Cunningham (2006)	UK ***	-	BDD-YBOCS Diagnosis confirmed by psychiatrist	40	16	24	3 (7.5%) [1.9, 20.6]	1 (6.3%) [0.0, 30.3]	2 (8.3%) [1.2, 27.0]
de Jongh et al. (2009)	Netherlands *(May - Oct. 2006)*	-	DSM-IV-TR criteria for BDD	170	64	106	7 (4.1%) [1.9, 8.4]	Missing	Missing
Yassaei, Goldani-Moghadam, Aghili, and Tabatabaei (2014)	Iran *(Oct. 2011 - Sept. 2012)*	BDD-YBOCS (self-report questionnaire). Patients with obvious physical defects were excluded	No interview	270	103	167	15 (5.6%) [3.3, 9.0]	2 (1.9%) [0.1, 7.2]	13 (7.8%) [4.5, 13.0]
			Total	480	183	297	25	-	-
			Weighted prevalence				5.2% [3.5, 7.6]	2.5% [0.8, 7.5]	7.9% [4.8, 12.6]

Z	-14.13**	-9.16**	-6.25**
χ^2	0.00	-	-
τ^2	0.00	-	-

note: None of these studies assessed patients for any other disorder. *** = no information given about time period of prevalence.
*DSM-IV-TR = Diagnostic and Statistical Manual for Mental Disorders 4th Edition- Revised (American Psychiatric Association, 2000); BDD-YBOCS = Yale Brown Obsessive Compulsive Disorder Scale for Body Dysmorphic Disorder (Phillips et al., 1997); χ^2 = Chi square statistic for likelihood ratio test comparing random vs. fixed effect model; Z = test of whether prevalence differs from 0; τ^2 = between-study variance of prevalence; ** $p \leq .001$; * $p \leq .05$.*

Table 11.
Prevalence of BDD in general dermatology clinics

Reference	Location *(Recruitment period)*	BDD screening tool	Interview	Participants			*n* (%) with BDD [CI 95%]		
				Total	Male	Female	Total	Male	Female
Phillips et al. (2000)	USA ***	BDDQ Dermatologist-rated defect severity scale (1-5)	BDD-SCID for DSM-IV	118	35	83	17 (14.4%) [9.1, 22.0]	Missing	Missing
Calderon et al. (2009)	Chile *(Dec. 2005 - Jan. 2006)*	BDDQ-DV	No interview	281	70	211	34 (12.1%) [8.8, 16.5]	5 (7.1%) [2.7, 16.0]	29 (13.7%) [9.7, 19.1]
Hsu et al. (2009)	Singapore ***	BDDQ-DV	No interview	198	48	150	58 (29.3%) [23.4, 36.0]	19 (39.6%) [27.0, 53.7]	39 (26.0%) [19.6, 33.6]
Conrado et al. (2010)	Brazil ***	BDDQ-DV Psychiatrist-rated defect severity scale (1-5)	BDD-SCID, I/P for DSM-IV	150	36	114	10 (6.7%) [3.5, 12.0]	3 (8.3%) [2.1, 22.6]	7 (6.1%) [2.8, 12.4]
Dogruk-Kacar et al. (2014)	Turkey *(Feb. & May 2013)*	BDDQ-DV Dermatologist-rated defect severity scale (1-5)	No interview	167	40	127	7 (4.2%) [1.9, 8.6]	3 (7.5%) [1.9, 20.6]	4 (3.2%) [1.0, 8.1]

Total	914	229	685	126	-	-
Weighted prevalence				11.3% [6.0, 20.2]	14.0% [6.0, 29.2]	13.4% [8.0, 21.6]
			Z	-5.90**	-6.31**	-3.82**
			χ^2	40.98**	11.24**	12.78**
			τ^2	0.54	0.28	0.69
			I^2	87.8%	76.5%	73.3%

note: None of these studies assessed patients for any other disorder. *** = no information given about time period of prevalence.
*BDDQ = Body Dysmorphic Disorder Questionnaire (Phillips, 1996); BDD-SCID for DSM-IV = Body Dysmorphic Disorder module of the Structured Clinical Interview for DSM-IV (Phillips et al., 1995); BDDQ-DV = Body Dysmorphic Disorder Questionnaire- Dermatology Version (Dufresne et al., 2001); BDD SCID-I/P for DSM-IV = Body Dysmorphic Disorder module of the Structured Clinical Interview for DSM-IV, patient version (First et al., 1995b); χ^2 = Chi square statistic for likelihood ratio test comparing random vs. fixed effect model; Z = test of whether prevalence differs from 0; τ^2 = between-study variance of prevalence; I^2 = percentage of between study variance which is due to heterogeneity rather than chance; ** $p \leq .001$; * $p \leq .05$.*

Table 12.
Prevalence of BDD in cosmetic dermatology clinics

Reference	Location *(Recruitment period)*	BDD screening tool	Interview	Participants			*n* (%) with BDD [CI 95%]		
				Total	Male	Female	Total	Male	Female
Phillips et al. (2000)	USA ***	BDDQ Dermatologist-rated defect severity scale (1-5)	BDD-SCID for DSM-IV	150	46	104	15 (10.0%) [6.1, 16.0]	Missing	Missing
Dufresne et al. (2001)	USA ***	BDDQ-DV Dermatologist-rated defect severity scale (1-5)	BDD-SCID for DSM-IV	46	10	36	7 (15.2%) [7.3, 28.5]	Missing	Missing
Castle et al. (2004)	Australia *(Sept.- Nov. 2001)*	DCQ Surgeon-rated defect severity scale (0-8)	BDD-SCID	137	18	119	4 (2.9%) [0.9, 7.5]	Missing	Missing
Conrado et al. (2010)	Brazil ***	BDDQ-DV Psychiatrist-rated defect severity scale (1-5)	BDD-SCID, I/P for DSM-IV	150	14	136	21 (14.0%) [9.3, 20.5]	1 (7.1%) [0.0, 33.5]	20 (14.7%) [9.7, 21.7]

Dogruk-Kacar et al. (2014)	Turkey *(Feb. & May 2013)*	BDDQ-DV Dermatologist-rated defect severity scale (1-5)	No interview	151	28	123	13 (8.6%) [5.0, 14.3]	2 (7.1%) [0.9, 23.7]	11 (8.9%) [4.9, 15.5]
			Total	634	116	518	60	-	-
			Weighted prevalence				9.2% [5.9, 13.9]		
						Z	-9.49**	-	-
						χ^2	3.17*	-	-
						τ^2	0.18	-	-
						I^2	0.0%	-	-

note: None of these studies assessed patients for any other disorder. *** = no information given about time period of prevalence.
*BDDQ = Body Dysmorphic Disorder Questionnaire (Phillips, 1996); BDDQ-DV = Body Dysmorphic Disorder Questionnaire- Dermatology Version (Dufresne et al., 2001); BDD SCID-I/P for DSM-IV = Body Dysmorphic Disorder module of the Structured Clinical Interview for DSM-IV, patient version (First et al., 1995b); DCQ = Dysmorphic Concern Questionnaire (Oosthuizen et al., 1998); χ^2 = Chi square statistic for likelihood ratio test comparing random vs. fixed effect model; Z = test of whether prevalence differs from 0; τ^2 = between-study variance of prevalence; I^2 = percentage of between study variance which is due to heterogeneity rather than chance; ** $p \leq .001$; * $p \leq .05$.*

Table 13.
Prevalence of BDD in acne clinics

Reference	Location *(Recruitment period)*	BDD screening tool	Interview	Participants			*n* (%) with BDD [CI 95%]			Other disorders
				Total	Male	Female	Total	Male	Female	
Uzun et al. (2003)	Turkey *(Feb. 2000 – March 2001)*	Dermatologist-rated acne severity scale (0-8)	BDD-SCID for DSM-IV (Turkish v.)	159	82	77	14 (8.8%) [5.2, 14.3]	8 (9.8%) [4.8, 18.3]	6 (7.8%) [3.3, 16.3]	Dysthymia: 9(5.7%); social phobia: 12(7.5%); MDD: 9(5.7%); GAD: 3 (1.9%); somatization dis: 3(1.9%); OCD: 3(1.9%)
Bowe et al. (2007)	USA *(Winter & Spring 2006)*	BDDQ-DV Dermatologist-rated acne severity scale (0-8)	No interview	128	36	92	18 (14.1%) [9.0, 21.2]	Missing	Missing	-
			Total	287	118	169	32	-	-	
			Weighted prevalence				11.1% [8.0, 15.3]	-	-	
						Z	-11.07**	-	-	
						χ^2	-	-	-	
						τ^2	-	-	-	

note: BDD-SCID (Turkish v.) for DSM-IV = Turkish version of the Body Dysmorphic Disorder module of the Structured Clinical Interview for DSM-IV (Corapcıoglu et al., 1999); BDDQ-DV = Body Dysmorphic Disorder Questionnaire- Dermatology Version (Dufresne et al., 2001); χ^2 *= Chi square statistic for likelihood ratio test comparing random vs. fixed effect model; Z = test of whether prevalence differs from 0;* τ^2 *= between-study variance of prevalence;* ** $p \leq .001$; * $p \leq .05$.